Table S1. Survey data and video analysis of hillslope dry ravel experiments[a]

Sample	Size class (cm)	X (m)	Y (m)	Z (m)	d (m)	V_0 (m/s)	Time (s)	V_{mean} (m/s)	n bounces	Δt (s)
LT1	2	0.91	-0.09	-0.84	1.24					
LT2	2	4.22	-0.72	-3.57	5.53					
LT3	2	10.65	0.08	-8.64	13.72		9.1	1.5	24	0.38
LT4	2	3.82	-0.08	-3.29	5.05					
LT5	2	1.72	-0.04	-1.63	2.37					
LT6	2	9.92	0.24	-8.06	12.78					
LT7	2	0.83	-0.08	-0.85	1.19					
LT8	2	1.09	0.14	-0.97	1.46	1.1	1	1.6	4	0.25
LT9	2	8.89	0.36	-7.31	11.51	1.6	12.7	0.9		
LT10	2	1.65	-0.12	-1.5	2.24					
LT11	2	1.06	0.15	-0.94	1.42	1.7	1.5	0.9	4	0.38
LT12	2	1.69	-0.34	-1.59	2.32	1.4	2.6	0.9	11	0.24
LT13	2	2.46	0.41	-2.19	3.29	1.6	2.3	1.5	6	0.38
LT14	2	3.22	0.03	-2.82	4.28		3.3	1.3	10	0.33
LT15	2	1.05	0.17	-0.92	1.4	1.2	1.2	1.2	3	0.4
LT16	2				runner					
LT17	2	1	0.09	-0.9	1.34	1.8	1.2	1.1	5	0.24
LT18	2	0.98	0.07	-0.88	1.32	1.6	0.6	2.2	2	0.3
LT19	2	2.44	0.5	-2.13	3.24		3	1.1	5	0.6
LT20	2	2.58	-0.83	-2.22	3.41	1.6	1.8	1.9	7	0.26
LT21	2	6.41	0.45	-5.26	8.29	1.5	3.9	2.1	13	0.3
LT22	2	1.43	-0.3	-1.34	1.96		1.9	1.1	7	0.27
LT23	2	2.46	0.31	-2.16	3.27	1.6	2.4	1.4	7	0.34
LT24	2	6.56	-0.14	-5.53	8.58	1.6	6.9	1.2	27	0.26
LT25	2	1.47	-0.26	-1.37	2.01		2.1	0.9	6	0.35
LT26	2	2.14	0.32	-1.88	2.85		2.3	1.2	8	0.29
LT27	2	1.46	-0.19	-1.38	2.01	1.2	2	1	10	0.2
LT28	2	2.77	0.56	-2.36	3.64	1.9	2.7	1.4	7	0.39
LT29	2	0.92	0.01	-0.85	1.26	1.4	0.8	1.6	3	0.27
LT30	2	6.33	0.75	-5.14	8.16	1.9	4.9	1.7	14	0.35
LT31	2	3.5	-0.33	-2.97	4.59	1.6	1.8	2.6	7	0.26
LT32	2	4.37	0.4	-3.68	5.71	1.6	7.1	0.8	15	0.47

LT33	2				runner					
LT34	2	1.65	-0.09	-1.5	2.23	1.6	2.9	0.8	6	0.48
LT35	2	6.37	0.11	-5.33	8.3		7.3	1.1	20	0.37
LT36	2	1.54	-0.32	-1.4	2.08		1.6	1.3	4	0.4
LT37	2				runner	1.8	8.4	1.7		
LT38	2				runner		8.7	1.6		
LT39	2	2.43	0.46	-2.14	3.24		2.2	1.5	7	0.31
LT40	2	0.96	0.01	-0.86	1.29		1.1	1.2	3	0.37
LT41	2	1.74	-0.26	-1.61	2.37		2.1	1.2	6	0.35
LT42	2				runner	1.6	5.2	2.7		
LT43	2	0.58	0.01	-0.55	0.8	1.3	0.8	1	2	0.4
LT44	2	9.75	0.32	-7.96	12.59		6.6	1.9	21	0.31
LT45	2	2.29	0.42	-2	3.04		2.3	1.3	7	0.33
LT46	2	1.52	-0.08	-1.4	2.06		2.5	0.8	7	0.36
LT47	2	0.97	0.08	-0.86	1.29		1	1.3	2	0.5
LT48	2	2.11	0.25	-1.89	2.83		1.2	2.3	4	0.3
LT49	2	9.95	0.52	-8.15	12.86	1.6	9.8	1.3	13	0.75
LT50	2	9.73	0.26	-8	12.6	2	14.4	0.9		
LT51	2	3.45	-0.39	-2.98	4.56		2.1	2.2	6	0.35
LT52	2	4.62	-0.21	-3.73	5.94		4.7	1.3	14	0.34
LT53	2	3.39	-0.27	-2.92	4.48		2.3	1.9	5	0.46
LT54	2	3.87	-0.47	-3.29	5.08		3.2	1.6	11	0.29
LT55	2	1.65	-0.11	-1.36	2.13		1	2.2	3	0.33
LT56	2	1.01	0.15	-0.87	1.34		1	1.3	4	0.25
LT57	2	1.3	-0.1	-1.23	1.79		1.9	0.9	4	0.48
LT58	2	0.92	0.01	-0.84	1.25		1.5	0.8	5	0.3
LT60	10				runner	2	4	3.5	14	0.29
LT61	10				runner	2	4.1	3.4	17	0.24
LT62	10				runner		4.7	3	17	0.28
LT63	10				runner	2	2.7	5.2	13	0.21
LT64	10	2.88	-0.08	-2.47	3.8	1.6	3.1	1.2	12	0.26
LT65	10				runner	1.8	4	3.5	14	0.29
LT66	10				runner		4.1	3.4	19	0.22
LT67	10				runner		4	3.5	13	0.31
LT68	10				runner	2	3.5	4	13	0.27

LT69	10	6.25	-0.27	-5.26	8.17	1.6	6.3	1.3	24	0.26
LT70	10	2.88	-0.12	-2.46	3.78					
LT72	10				runner		7.1	2	28	0.25
LT73	10	1.37	-0.12	-1.36	1.93					
LT74	10	5.72	0.06	-4.82	7.48	1.8	3.2	2.3	12	0.27
LT75	10				runner		3.9	3.6	15	0.26
LT76	10	0.46	-0.12	-0.51	0.69					
LT77	10				runner	1.2	6.8	2.1	25	0.27
LT78	10				runner	1.9	6.9	2	22	0.31
LT79	10				runner					
LT80	10	0.51	-0.07	-0.57	0.76					
LT81	10				runner	1.8	4.9	2.9		
LT82	10	6.39	0.2	-5.41	8.37		6.6	1.3	23	0.29
LT83	10	2.56	-0.07	-2.27	3.43		2	1.7	12	0.17
LT84	10	2.23	0.02	-2	3		1.8	1.7	8	0.23
LT85	10				runner		4.6	3.1	16	0.29
LT86	10				runner		3.8	3.7	14	0.27
LT87	10	2.3	-0.16	-2.02	3.06		1.5	2.1	7	0.21
LT88	10				runner		4.3	3.2	14	0.31
LT89	10				runner		3.3	4.3	9	0.37
LT90	10	1.6	0.28	-1.34	2.09					
LT91	10	6.28	0.85	-5.11	8.09		4.1	2		
LT92	10				runner		4.4	3.2	12	0.37
LT93	10				runner		5.1	2.7	0	
LT94	10				runner		4.2	3.3	11	0.38
LT95	10				runner		3.8	3.7	10	0.38
LT97	10				runner		3.5	4	10	0.35
LT98	10				runner	1.5	5.1	2.7		
LT99	10				runner		4.6	3.1	15	0.31
LT100	10				runner		6	2.3		
LT101	10				runner		3.1	4.5	12	0.26
LT102	10				runner		4.9	2.9		
LT103	10				runner	2	5.9	2.4		
LT104	10				runner		5.8	2.4		
LT105	10	2.37	0.12	-2.06	3.15	2	1.8	1.7		

LT106	5	8.16	-0.07	-6.73	10.58		6.2	1.7		
LT107	5	3.13	0.34	-2.67	4.11		4.5	0.9		
LT108	5	3.41	-0.16	-2.97	4.52		4.2	1.1		
LT109	5	0.71	-0.1	-0.73	1.02		1	1		
LT110	5				runner		6.4	2.2		
LT111	5	2.44	0.46	-2.12	3.23		2.6	1.2		
LT112	5	2.35	0.11	-2.08	3.14		2.5	1.2		
LT113	5				runner		7.4	1.9		
LT114	5	0.84	-0.38	-0.87	1.21		1.1	1.1		
LT115	5	0.82	-0.37	-0.83	1.17		0.8	1.4		
LT116	5	2.12	-0.15	-1.94	2.88	1.7	3.5	0.8		
LT117	5				runner	1.8	10.4	1.3		
LT118	5				runner					
LT119	5	2.51	-0.11	-2.23	3.36					
LT120	5	1.34	-0.16	-1.28	1.85		1.7	1.1		
LT121	5	9.27	0.29	-7.6	11.99		7	1.7		
LT122	5	4.74	0.25	-4.02	6.22	1.8	3.8	1.6		
LT123	5	0.22	-0.05	-0.26	0.34					
LT124	5	1.49	0.36	-1.24	1.94		1.2	1.6		
LT125	5	2.43	0.5	-2.06	3.18		1.7	1.9		
LT126	5				runner		8.5	1.6		
LT127	5	0.19	-0.08	-0.23	0.3					
LT128	5				runner		4.8	2.9		
LT129	5				runner					
LT130	5				runner	2.1	4.6	3.1	15	0.31
LT131	5	9.25	0.44	-7.6	11.97		8.3	1.4		
LT132	5	8.34	-0.13	-6.82	10.77	1.9	6.8	1.6		
LT133	5				runner					
LT134	5				runner		6	2.3	13	0.46
LT135	5				runner					
LT136	5	2.77	0.53	-2.35	3.63					
LT137	5	1.29	-0.45	-1.22	1.78		2.1	0.8		
LT138	5	6.71	0.06	-5.63	8.76		5.8	1.5		
LT139	5	1.72	-0.29	-1.56	2.32	2	1.5	1.6		
LT140	5				runner		6.2	2.3	18	0.34

LT141	5	2.4	0.54	-2.04	3.15	1.8	1.6	2		
LT142	5	2.01	0.27	-1.77	2.68					
LT143	5				runner		6.9	2		
LT144	5	1.38	0.21	-1.16	1.8	2	1	1.8		
LT145	5	2.48	-0.14	-2.15	3.28	1.8	1.7	2		
LT146	5				runner	1.7	5.7	2.5		
LT147	5				runner	1.6	6	2.3		
LT148	5	2.52	-0.24	-2.2	3.35		3.4	1		
LT149	5	6.26	0.88	-5.05	8.04					
LT150	5				runner					
LT151	5	4.22	-0.97	-3.51	5.49	1.8	3.4	1.6		
LT152	5				runner	1.4	4.8	2.9	15	0.32
LT153	5	4.04	0.13	-3.44	5.31					
LT154	5	8.54	-0.15	-6.84	10.95					
LT155	5				runner		4.3	3.3	12	0.36
LT156	5				runner					
LT157	5	7.24	0.54	-5.92	9.36		5.1	1.8		
LT158	5				runner		6.8	2.1		
LT159	5				runner		7.3	1.9		
LT160	5	0.7	-0.2	-0.7	0.99					
LT161	5	1.51	0.26	-1.2	1.93		1	1.9		
LT162	5	1.07	-0.04	-0.98	1.45	1.9	1.2	1.3		
LT163	5				runner					
LT164	5	3.47	0.03	-2.98	4.57		2.5	1.9		
LT165	5				runner					
LT166	5	8.3	0.01	-6.82	10.74		4.2	2.6		
LT167	5				runner	1.5	4.8	2.9		
LT168	5	2.53	0.04	-2.24	3.38	1.9	2	1.7		
LT169	5	9.1	0.59	-7.39	11.72		4.5	2.6		
LT170	5	2.55	-0.05	-2.21	3.38		1.7	2		
LT171	5	1.31	0.33	-1.1	1.71		1.1	1.5		
LT172	5	1.41	0.01	-1.26	1.89		1.1	1.8		
LT173	5	4.35	-0.21	-3.64	5.68		3.7	1.5		
LT174	5	2.47	0.48	-2.14	3.27					
LT175	5	1.39	-0.18	-1.32	1.92					

LT176	5	2.47	0.41	-2.15	3.27
LT177	5	0.69	-0.19	-0.68	0.97
LT178	5	5.98	-0.1	-5.07	7.84
LT179	5				runner
LT180	5				runner
LT181	5	6.4	-0.14	-5.35	8.34
LT182	5	9.71	-0.03	-7.89	12.51
LT183	5	6.32	0.04	-5.3	8.25
LT184	5	1.65	0.44	-1.32	2.11
LT185	5				runner
LT186	5	0.23	-0.1	-0.19	0.3
LT187	5				runner
LT188	5	7.69	0.62	-6.27	9.92
LT189	5	7.37	-0.44	-5.97	9.48
LT190	5				runner
LT191	5	2.05	0.45	-1.55	2.57
LT192	5				runner
LT193	5	2.55	0.2	-2.11	3.31
LT194	5				runner
LT195	5	1.06	0.1	-0.95	1.42
LT196	5				runner
LT197	5	4.87	-0.08	-4.13	6.39
LT198	5	1.08	0.5	-0.84	1.37

[a]Each sample corresponds to a single particle released from the top of the experimental hillslope (see Supporting Information Movies S1 and S2 for examples). X coordinate is in the (horizontal) distance downslope. Y coordinate is cross-slope position. Z is relative elevation. d is slope distance downslope, with particles that traversed the entire slope ($d > 14$ m) indicated as "runners". V_0 indicates initial velocity measured from 1.5 m prior to entering experimental slope (see main text). Time, V_{mean}, number of bounces, and mean hop time Δt are all determined from frame-by-frame video analysis of the experimental hillslope where possible. Not all particles were recorded with video, and some had obstructions that precluded specific measurements, as indicated by an absence of data. Time and V_{mean} for runners calculated only for upper 14 m of hillslope.